

Time resolved and time integrated spectroscopy of ultra-short pulse laser produced plasmas

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We are conducting experiments to determine the effects of target thickness and time history on the spectra from short pulse laser produced plasmas. The experiments are done using aluminum foils of successive thickness ranging from 250 Å to 1250 Å. The foils were heated with a 400 nm, 150 fs (FWHM) ultra short pulse laser. The laser energy was approximately 200 mJ and was focused to a spot size of 3 μm resulting in a peak intensity of 1.9×10^{19} W/cm². The prepulse to main pulse contrast was determined to be better than 10^7 . The $1s^2-1s2p$, $1s^2-1s3p$ transitions in He-like aluminum and the $1s-2p$ transitions in H-like aluminum were temporally resolved using a 900 fs x-ray streak camera. Time integrated K-shell measurements were made using a flat crystal spectrograph interfaced to a MCP and a CCD. High energy photons were detected with an open face CCD camera and correlated with the energy deposition into the CCD. Data and analysis will be presented.

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